WE CLAIM:

1. A surface plasmon resonance sensor, comprising:

a source of polarized light at a selected wavelength;

a surface plasmon layer, comprising:

a resonance film, formed of a selected material to a selected thickness so that the polarized light from the source establishes surface plasmon resonance at a surface of the resonance film, the surface plasmon resonance producing an evanescent wave extending away from the surface of the resonance film over a sensing range; and

a hard protective film overlying the surface of the resonance film, and having a thickness that is substantially less than the sensing range;

a light transmissive medium disposed between the source and the surface plasmon layer; and

a photodetector array, for detecting intensity of polarized light reflected from the resonance film.

2. The sensor of claim 1, wherein the hard protective film consists essentially of a material selected from the group consisting of silicon carbide, diamond-like carbon, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, aluminum oxide, aluminum nitride, beryllium oxide, and tantalum oxide.

3. The sensor of claim 1, wherein the resonance film comprises gold.

4. The sensor of claim 1, further comprising:

an intermediate mirror, positioned relative to the photodetector array so as to reflect, to the photodetector array, polarized light reflected from the resonance film.

5. The sensor of claim 4, wherein the light transmissive medium is a housing disposed over the source and the photodetector array;

and wherein the surface plasmon layer and the intermediate mirror are mounted to surfaces of the housing.

6. The sensor of claim 1, wherein the light transmissive medium is a housing disposed over the source and the photodetector array;

and wherein the surface plasmon layer and the intermediate mirror are mounted to surfaces of the housing.

7. The sensor of claim 1, wherein the source comprises:

a light-emitting diode; and

a polarizing element disposed between the light-emitting diode and the surface plasmon layer.

8. The sensor of claim 1, further comprising:

a substrate, to which the source and photodetector array are physically mounted; and

a plurality of leads, electrically connected to the photodetector array.

9. A surface plasmon resonance sensor, comprising:

a source of polarized light at a selected wavelength;

a surface plasmon layer, comprising:

a resonance film; and

an overlying hard protective film, consisting essentially of a material selected from the group consisting of silicon carbide, diamond-like carbon, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, aluminum oxide, aluminum nitride, beryllium oxide, and tantalum oxide;

a light transmissive medium disposed between the source and the surface plasmon layer; and

a photodetector array, for detecting intensity of polarized light reflected from the resonance film.

10. The sensor of claim 9, wherein the resonance film comprises gold.

11. The sensor of claim 9, further comprising:

an intermediate mirror, positioned relative to the photodetector array so as to reflect, to the photodetector array, polarized light reflected from the resonance film.

12. The sensor of claim 11, wherein the light transmissive medium is a housing disposed over the source and the photodetector array;

and wherein the surface plasmon layer and the intermediate mirror are mounted to surfaces of the housing.

13. The sensor of claim 9, wherein the light transmissive medium is a housing disposed over the source and the photodetector array;

and wherein the surface plasmon layer and the intermediate mirror are mounted to surfaces of the housing.

14. The sensor of claim 9, wherein the source comprises:

a light-emitting diode; and

a polarizing element disposed between the light-emitting diode and the surface plasmon layer.

15. The sensor of claim 9, further comprising:

a substrate, to which the source and photodetector array are physically mounted; and

a plurality of leads, electrically connected to the photodetector array.

16. An instrument for measuring the refractive index of a liquid, comprising:

a housing, having an opening;

a surface plasmon sensor, comprising:

a source of polarized light at a selected wavelength;

a surface plasmon layer exposed through the opening in the housing, and comprising:

a resonance film, formed of a selected material to a selected thickness so that the polarized light from the source establishes surface plasmon resonance at a surface of the resonance film, the surface plasmon resonance producing an evanescent wave extending away from the surface of the resonance film over a sensing range; and

a hard protective film overlying the surface of the resonance film, and having a thickness that is substantially less than the sensing range;

a light transmissive medium disposed between the source and the surface plasmon layer; and

a photodetector array, for detecting intensity of polarized light reflected from the resonance film; and

an output device for outputting an indication based upon an angle at which the polarized light is absorbed by a sample medium dispensed into the opening.

17. The instrument of claim 16, wherein the hard protective film consists essentially of a material selected from the group consisting of silicon carbide, diamond-like carbon, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, aluminum oxide, aluminum nitride, beryllium oxide, and tantalum oxide.

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